Chapter 3: *In vitro* antioxidant activities of aqueous extract and Polysaccharide Protein Complex (PPC-*Pr*) Complex isolated from the mushroom, *Phellinus rimosus*

Chapter 4: *In vitro* radioprotective activities of aqueous extract and PPC-*Pr* Complex .

Chapter 5: *In vivo* radioprotective activities of PPC-*Pr* Complex .

a) Effect of PPC-*Pr* Complex on haematopoietic system.

b) Effect of PPC-*Pr* Complex on tissue antioxidant levels.

c)) Effect of PPC-*Pr* Complex on gastrointestinal system.

Chapter 6: *In vivo* genoprotective studies of PPC-*Pr* Complex.

Chapter 7: Toxicity studies of PPC-*Pr* Complex

References:

1. Adams AK, Wermuth EO. Antioxidant vitamins and the prevention of coronary heart disease. *Am Fam Physician.* 1999; 60**:** 895-905.
2. Ajith TA, Janardhanan KK. Antioxidant and antihepatotoxic activities of *Phellinus rimosus* (Berk) Pilat. *J. Ethanopharmacol* 2002; 81:387.
3. Ajith TA, Janardhanan KK. Antioxidant and anti-inflammatory activities of methanolic extract of *Phellinus rimosus* (Berk) Pilat. *Ind J Exp Biol.* 2001; 39: 1166-.1169.
4. Ajith TA, Janardhanan KK. Cytotoxic and antitumor activities of a polypore macro fungus, *Phellinus rimosus* (Berk) Pilat. *J. Ethnopharmcol* 2003; 84: 157.
5. Arora R, Gupta D, Chawla R, Sagar R, Sharma A, Kumar R, Prasad J, Singh S, Samanta N, Sharma RK. Radioprotection by plant products: present status and future prospects. *Phytother Res.* 2005; 19: 1-22.
6. Bae JS, Ahn SJ, Jang KH, Yim H, Jin HK. Prevention of intraperitoneal adhesions and abscesses by polysaccharides isolated from *Phellinus* spp. in a rat peritonitis model. *Ann Surg* 2004 a, 241, 534-540.

7. Bae JS, Jang KH, Jin HK. Comparison of intraperitoneal anti-adhesive polysaccharides derived from *Phellinus* mushrooms in a rat peritonitis model. *World J Gastroenterol* 2004 b, 11, 810-816.
8. Bae JS, Jin HK, Jang KHc. The effect of polysaccharides and carboxylcellulose combination to prevent intraperitoneal adhesion and abscess formation in a rat peritonitis model. *J Vet Med Sci* 2004c: 66; 1205-1211.
9. Bae JS, Jang KH, Yim H, Jin HK. Polysaccharides isolated from *Phellinus gilvus* inhibit melanoma growth in mice. Cancer Lett 2004d; 218: 43-52.
10. Bloomer WD, Hellman S. Normal tissue responses to radiation therapy. *N Engl J Med*. 1975; 293: 80- 83.
11. Bump EA, Malaker K. Radioprotectors: Chemical, Biological and Clinical Perspective. CRC Press, Boca Raton, FL, 1998.
12. Fang YZ. Effect of ionizing radiation on superoxide dismutase *in vitro and in vivo*. In: Fang YZ (English edition). Advances in free radical biology and medicine.1. Atomic Energy Press, Beijing, 1991.
13. Gi-Su-Oh, Myeong-Su Lee, Hyun-OK Pae. Effects of oral administration of *P.linteus* on production of Th-1 and Th-2 type cytokines in mice. *Immunopharmcol Immunotoxicol* 2006; 28: 281- 293.
14. Gofman JW. Preventing breast cancer: The story of a major, proven, preventable cause of this disease, 2nd ed. San Francisco, Committee for Nuclear Responsibility, 1996.
15. Hensley ML, Schuchter LM, Lindley C l. American Society of Clinical Oncology clinical practice guidelines for the use of chemotherapy and radiotherapy protectants. *J Clin Oncol* 1999;17:3333–3355.
16. Jin M, Jeon H, Jung HJ. Enhancement of repopulation and haematopoiesis of bone marrow cells in irradiated mice by oral administration of PG101, a water soluble extract from *Lentinus lepideus*. *Exp Biol Med (May –wood)* 2003; 228:759.
17. Kang KA, Zhang R, Lee KH, Chae S, Kim BJ, Kwak YS, Park JW, Lee NH, Hyun JW. Protective effect of triphlorethol-A from Ecklonia cava against ionizing radiation *in vitro*. *J Radiat Res (Tokyo)*. 2006; 47: 61-68.

18. Kim GY, JY, Lee JO, Lee CH, Ryu BT, Choi YK, Jeong KW, Lee SC, Jeong YHC. Partial characterization and immunostimulatory effect of a novel polysaccharide-protein complex extracted from *Phellinus linteus*. *Biosci Biotechnol Biochem.* 2006; 70:1218-1226.

19. Kim GY, Park SK, Lee MK, Lee YH, Oh JY, Kwak S, Yoon JD, Lee YM. Proteoglycan isolated from *P.linteus* activates murine B lymphocytes via protein kinase C and protein tyrosine kinase. *Int Immunopharmacol* 2003a; 3: 1281-1292.

20. Leelavathy KM, Ganesh PN. Polypores of Kerala, Daya Publishing House, New Delhi, India, 2000.

21. Mathes SJ, Alexander J. Radiation injury. *Surg Oncol Clin N Am*. 1996; **5**: 809- 824.

22. Meera CR, Nitha B, Janardhanan KK. Anti-inflammatory and free radical scavenging activities of Polysaccharide –Protein complex isolated from *Phellinus rimosus* (Berk.) Pilat (Aphyllophoromycetideae). *Int J Med Mushrooms* 2009a; 11: 365- 373.

23. Meera CR, Smina TP, Nitha B. Antiarthritic activities of a Polysaccharide –Protein complexisolated from *Phellinus rimosus* (Berk.) Pilat (Aphyllophoromycetideae) in Freunds Complete Adjuvant induced arthritic rats. *Int J Med Mushrooms* 2009b; 11: 21-25.

24. Mitchell JB, Russo A, Kuppusamy P, Krishna MC. Radiation, radicals, and images. *Ann NY Acad Sci.* 2000; 899: 28- 43

25. Nair CKK, Parida DK, Nomura T. Radioprotectors in radiotherapy. *J Radiat Res*. 2001; 42: 21-37.

26. Steel GG. Basic clinical radiobiology. Edward Arnold Publishers, London, 2002.

27. Uma Devi P, Bisht KS, Vinitha M . A Comparative Study of Radioprotection by Ocimum Flavinoids and Synthetic Aminothiol Protectors in the Mouse. *Br J Radiol.* 1998; **71:** 782–784.

28. Uma Devi P, Ganasoundari A, Rao BS, Srinivasan KK. *In vivo* radioprotection by Ocimum flavinoids: survival of mice. *Radiat Res*. 1999; 151**:** 74–78.

29. Verma A, Keshervani GP, Sharma YK, Keshwal RL, Singh P. 1987b. Nutritional evaluation of dehydrated mushrooms. *Ind J Nutr Dietet*. 1987a; 24: 380-386.

30. Verma A, Keshervani GP, Sharma YK, Sawarkar NJ, Singh P. Mineral content of edible mushrooms. *Ind J Nutr Dietet*. 1987a; 24: 241-245.
31. Wasser SP. Medicinal mushrooms as a source of antitumor and immunomodulating polysaccharides. *Appl Microbiol Biotechnol* 200; 60: 258 – 274.
32. Weiss JF, Landauer MR. Radioprotection by antioxidants, *Annals of the New York Academy of Sciences*. 2000; 899: 44-60.
33. Weiss JF, Simic MG. Perspectives in Radioprotection. *Pharmacol Ther.* 1988; 39: 1 -414.
34. Ying JZ, Mao XL, Ma QM. Illustrations of Chinese medicinal fungi. Science Press, Beijing, 1987.

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